

CONTINUATION-IN-PART APPLICATION

FOR

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TITLE: REMOTE CONTROLLER WITH A USER-  
PROGRAMMABLE COMMAND TRANSMIT KEY

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## REMOTE CONTROLLER WITH A USER-PROGRAMMABLE COMMAND TRANSMIT KEY

### CROSS-REFERENCE TO RELATED APPLICATION

5 This application is a continuation-in-part of U.S.  
Patent Application Serial No. 09/851,924, filed on May  
09, 2001.

### BACKGROUND OF THE INVENTION

#### 1. Field of the Invention

10 The invention relates to a remote controller, more  
particularly to a remote controller for automobiles that  
includes a user-programmable command transmit key.

#### 2. Description of the Related Art

15 A conventional remote controller for automobiles  
generally includes at least three function keys, which  
are defined with three different control functions,  
respectively. In addition, the function keys can be  
operated simultaneously in pairs to result in three other  
pre-defined control functions. To aid users in  
memorizing the available control functions and their  
20 associated key combinations, manufacturers generally  
provide the remote controllers with an appropriate  
look-up table guide. However, as the number of the  
available control functions increases, the likelihood  
of confusion increases as well because the available  
25 control functions and the actual number of keys on the  
remote controller have a many-to-one relationship.  
Therefore, the user has to rely heavily on the look-up

table guide to be able to operate the conventional remote controller properly.

In U.S. Patent Nos. 4890108, 5774051, 5739747, 5940007, and 6243022, there are disclosed conventional remote control transmitters that include a housing, a control circuit disposed in the housing, a function key set mounted on the housing and connected to the control circuit, and a function display unit mounted on the housing and connected to the control circuit. The control circuit includes a microprocessor and a transmitter circuit connected to the microprocessor. The function key set includes a select key to enable the microprocessor to select among control signals indicated on the function display unit, and a transmit key that enables the microprocessor to activate the transmitter circuit for transmitting the selected control signal wirelessly.

The devices in each of U.S. Patent Nos. 4890108 and 5774051 further include an audio output unit that provides an audible output during operation of the function key set.

The function display unit disclosed in U.S. Patent No. 5774051 includes light emitting diodes, and patterns, each of which is disposed adjacent to a respective one of the light emitting diodes and illustrates a control function associated with the respective one of the control signals. The select key enables the microprocessor to control the function display unit to

activate the light emitting diode corresponding to a selected one of the control signals accordingly.

The devices in each of U.S. Patent Nos. 5739747, 5940007 and 6243022 include an icon display to indicate the selected control function.

Moreover, the function key set disclosed in each of U.S. Patent Nos. 5739747, 5940007 and 6243022 includes preset keys in addition to the select and transmit keys. Each of the preset keys enables the microprocessor to control the transmitter circuit to transmit a predetermined one of the control signals.

Although the aforesaid conventional remote controllers include a function display unit that makes selection of desired control functions possible without the need to memorize key combinations, none of them provides a preset key that can be redefined by the user.

#### **SUMMARY OF THE INVENTION**

Therefore, the object of the present invention is to provide a remote controller that includes a function display unit and a user-programmable command transmit key so as to overcome the aforementioned drawbacks of the prior art.

According to the present invention, a remote controller capable of transmitting different control signals for controlling an anti-theft device on an automobile includes a casing, a controller circuit, a function key set, and a function display unit. The

controller circuit is disposed in the casing, and includes a processor unit, and a transmitter circuit connected electrically to and controlled by the processor unit so as to transmit the control signals wirelessly. The function key set is mounted on the casing, is connected electrically to the processor unit, and includes a function select key operable so as to control selection of the control signals by the processor unit, a first command transmit key operable so as to enable the processor unit to control the transmitter circuit to transmit a currently selected one of the control signals, and a user-programmable second command transmit key capable of being assigned with the currently selected one of the control signals and operable so as to enable the processor unit to control the transmitter circuit to transmit an assigned one of the control signals. The function display unit is mounted on the casing, and is connected electrically to and controlled by the processor unit so as to provide a visual indication corresponding to the currently selected one of the control signals.

#### **BRIEF DESCRIPTION OF THE DRAWINGS**

Other features and advantages of the present invention will become apparent in the following detailed description of the preferred embodiments with reference to the accompanying drawings, of which:

Figure 1 is a perspective view showing the first

preferred embodiment of a remote controller according to the present invention;

Figure 2 is a schematic circuit block diagram showing a controller circuit of the first preferred embodiment;

5        Figure 3 is a schematic view of a function display unit of the first preferred embodiment;

Figures 4 and 5 are schematic views showing a function display unit of the second preferred embodiment of a remote controller according to the present invention;  
10        and

Figures 6 and 7 are schematic views showing a function display unit of the third preferred embodiment of a remote controller according to the present invention.

#### **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS**

15        Before the present invention is described in greater detail, it should be noted that like elements are denoted by the same reference numerals throughout the disclosure.

Referring to Figures 1 to 3, the first preferred embodiment of a remote controller 1 according to the  
20        present invention is shown to include a casing 10, a controller circuit 11, a function key set 12, and a function display unit 113.

The remote controller 1 is adapted to be used for  
25        transmitting different control signals to control the operation of an anti-theft device (not shown) on an automobile (not shown).

The controller circuit 11 is mounted on a circuit board (not shown) disposed in the casing 10, and includes a processor unit 110 and a radio frequency (RF) transmitter circuit 111. The transmitter circuit 111 is connected electrically to and controlled by the processor unit 110 so as to transmit the control signals wirelessly.

The controller circuit 11 further includes an RF receiver circuit 112, an audio output unit 114, and a power supply unit 115. The RF receiver circuit 112 is connected electrically to the processor unit 110, and is adapted to receive acknowledge or alarm signals from the anti-theft device and to provide the same to the processor unit 110 in a known manner. The audio output unit 114, such as a buzzer, is connected electrically to and controlled by the processor unit 110 so as to generate an audible output. The power supply unit 115 is connected electrically to the processor unit 110, and supplies electric power to the processor unit 110.

The function key set 12 is mounted on and is externally accessible from casing 10, and is connected electrically to the processor unit 110. In this embodiment, the function key set 12 includes a function select key (K1), a first command transmit key (K2), and a user-programmable second command key (K3). The function select key (K1) is operable so as to control selection of the control signals by the processor unit 110.

The function display unit 113 is mounted on and is externally accessible from the casing 10, and is connected electrically to the processor unit 110. In this embodiment, the function display unit 113 includes  
5 a plurality of lamp units 1130, and a plurality of patterns 1131 disposed adjacent to the lamp units 1130, respectively. Each of the lamp units 1130 corresponds to a respective one of the control signals and is activated by the processor unit 110 when the respective  
10 one of the control signals is currently selected by the processor unit 110. The lamp units 1130 are preferably light emitting diodes. The patterns 1131 may be in text or graphic form. Each of the patterns 1131 illustrates a control function associated with the control signal  
15 of the adjacent lamp unit 1130.

The processor unit 110 is operable in a first command transmission mode, where operation of the first command transmit key (K2), after operation of the function select  
key (K1) to select one of the control signals and to  
20 enable the processor unit 110 to control the function display unit 113 for providing a visual indication corresponding to the currently selected one of the control signals, further enables the processor unit 110 to control the transmitter circuit 111 for transmitting  
25 the currently selected one of the control signals.

In particular, every time that the function select key (K1) is operated, the processor unit 110 will be



enabled to select the control signals sequentially, and will activate the lamp unit 1130 corresponding to the selected one of the control signals accordingly. After selection of the desired control signal to be transmitted, the first command transmit key (K2) is operated so as to enable the processor unit 110 to activate the transmitter circuit 111 so that the currently selected one of the control signals can be transmitted wirelessly for reception by the anti-theft device.

Preferably, whenever one of the control signals is selected, the processor unit 110 further controls the audio output unit 114 to generate an audio output. More preferably, the audio outputs generated by the audio output unit 114 vary for the different control signals.

Moreover, the processor unit 110 is operable in a key programming mode, where operation of the second command transmit key (K3), after operation of the function select key (K1) to select one of the control signals and to enable the processor unit 110 to control the function display unit 113 for providing the visual indication corresponding to the selected one of the control signals, further enables the processor unit 110 to assign the selected one of the control signals to the second command transmit key (K3).

The assignment of one of the control signals to the second command transmit key (K3) includes the following steps:

In step 1, the function select key (K1) is operated by pressing and releasing a number of times to enable the processor unit 110 to select the control signals sequentially and to activate the lamp unit 1130  
5 corresponding to the selected one of the control signals accordingly. After selection of the desired control signal to be assigned, in step 2, the function select key (K1) is operated by pressing and holding for a certain period of time (e.g., six seconds). Finally, in step  
10 3, the second command transmit key (K3) is operated so as to enable the processor unit 110 to assign the currently selected one of the control signals thereto. The second command transmit key (K3) can be reassigned with another one of the control signals by repeating  
15 the above steps 1 to 3.

Further, the processor unit 110 is operable in a second command transmission mode, where operation of the second command transmit key (K3), without prior operation of the function select key (K1), enables the  
20 processor unit 110 to control the transmitter circuit 111 for transmitting one of the control signals that is assigned to the second command transmit key (K3).

In particular, when the second command transmit key (K2) is operated, as long as the function select key (K1) is not operated in accordance with the assignment  
25 of one of the control signals to the second command transmit key (K3) as described hereinabove, the

processor unit 110 will activate the transmitter circuit 111 so that the currently assigned control signal can be transmitted wirelessly for reception by the anti-theft device.

5 Referring to Figure 4, the function display unit 113' of the second preferred embodiment of a remote controller according to the present invention is shown to include a liquid crystal display 1133 that is configured as a graphic interface for showing a plurality of function  
10 icons 1132 thereon. Each of the function icons 1132 is used to illustrate a control function associated with a respective one of the control signals. In this embodiment, the function select key (K1) enables the processor unit 110 to control the function display unit  
15 113' to highlight one of the function icons 1132 corresponding to the currently selected one of the control signals.

The selection operation of the processor unit 110 proceeds in a manner similar to that of the previous  
20 embodiment with the use of the function select key (K1) (see Figure 2).

As illustrated in Figure 4, the lock-arming control function is selected, and the corresponding function icon 1132 is highlighted accordingly. The lock-arming  
25 control signal is transmitted when the first command transmit key (K2) is operated.

In Figure 5, the function select key (K1) is operated

repeatedly from the state shown in Figure 4 until the function icon 1132 corresponding to the anti-theft control function is highlighted. Operation of the first command transmit key (K2) at this time will result in  
5 transmission of the anti-theft control signal. Like the previous embodiment, whenever one of the control signals is selected, the processor unit 110 further controls the audio output unit 114 to generate an audio output. More preferably, the audio outputs generated by the audio  
10 output unit 114 vary for the different control signals.

Figure 6 illustrates the third preferred embodiment of a remote controller according to the present invention. When compared with the second preferred embodiment, instead of highlighting, the function select key (K1)  
15 enables the processor unit 110 to control the function display unit 113 to position a cursor 1134 on one of the function icons 1132 corresponding to the currently selected one of the control signals.

The selection operation of the processor unit 110 proceeds in a manner similar to that of the previous  
20 embodiment with the use of the function select key (K1) (see Figure 2).

As illustrated in Figure 6, the lock-arming control function is selected, and the cursor 1134 is positioned  
25 on the corresponding function icon 1132 accordingly. The lock-arming control signal is transmitted when the first command transmit key (K2) is operated.

In Figure 7, the function select key (K1) is operated repeatedly from the state shown in Figure 6 until the cursor 1134 is positioned on the function icon 1132 corresponding to the anti-theft control function.

5 Operation of the first command transmit key (K2) at this time will result in transmission of the anti-theft control signal. Like the previous embodiments, whenever one of the control signals is selected, the processor unit 110 further controls the audio output unit 114 to

10 generate an audio output. More preferably, the audio outputs generated by the audio output unit 114 vary for the different control signals.

It has thus been shown that the remote controller 1 of this invention includes a user-programmable command

15 transmit key (K3), the assigned control signal of which can be redefined by the user. Upon operation of the user-programmable command transmit key (K3), the processor unit 110 is enabled to control the transmitter circuit 111 so that a currently assigned control signal

20 is transmitted.

While the present invention has been described in connection with what is considered the most practical and preferred embodiments, it is understood that this invention is not limited to the disclosed embodiments

25 but is intended to cover various arrangements included within the spirit and scope of the broadest interpretation so as to encompass all such modifications

and equivalent arrangements.